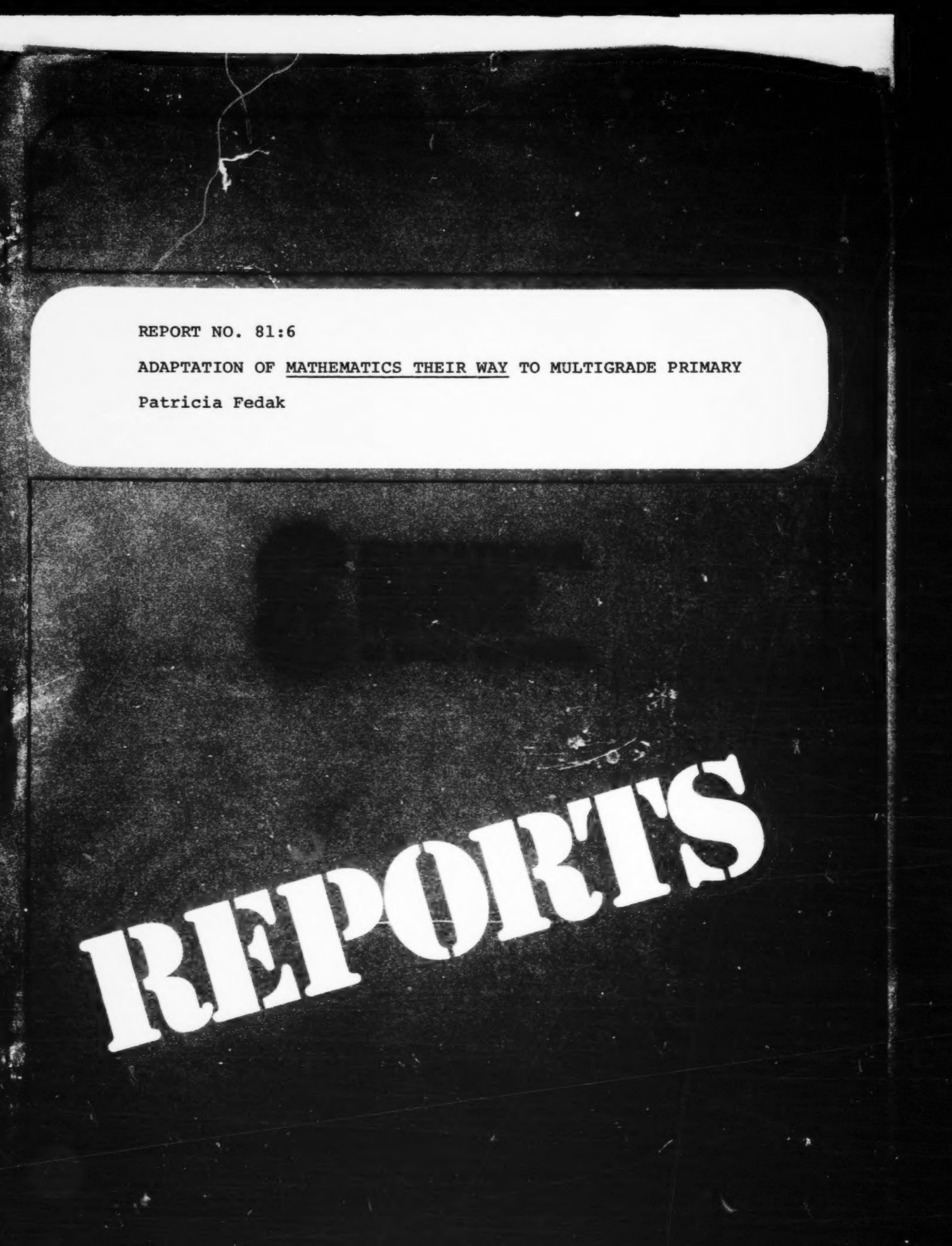
REPORT NO. 81:6

ADAPTATION OF MATHEMATICS THEIR WAY TO MULTIGRADE PRIMARY

Patricia Fedak



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Adaptation of 'MATHEMATICS THEIR WAY' to Multigrade Primary

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Developing concrete mathematical activities will increase a child's understanding of the abstract and interconnecting concepts he or she must learn. The Mathematics Their Way program works on the premise that,"...abstract symbolization is only used to label a concept which the child already grasps, never as a material from which the child is taught a concept."[1]

This philosophy of mathematics appeals to me, as a rural school teacher with twenty-four students ranging from Kindergarten to Grade Two. As a result of my interest in this program I have set up a series of lessons incorporating the three grade levels using the games and activities outlined in the Mathematics Their Way program. My goal is to adapt this program to a multigrade primary classroom.

There are several goals for this project. They are outlined as follows:

1. to save daily planning time for myself and others wishing to adapt this program to their classroom.
2. to serve the needs of more children according to their level of development rather than age or grade level.
3. to provide constructive tasks which reinforce taught concepts while other groups are receiving teacher led mini-lessons.
4. to provide an opportunity to manipulate concrete materials according to the concepts of mathematics before applying abstract symbols.
5. to provide enhancement to other areas of the curriculum (ie. language development, group co-operation and independance training). Although these are not target skills of the project, improvement in these will act as reinforcers to mathematics and other areas of the classroom program.

Mathematics Their Way: Organization, Materials and Purpose

Mathematics Their Way is a concrete materials based approach to teaching mathematics during Kindergarten, Grade One and Grade Two. It is organized in a resource book by Mary Baratta-Lorton. The book includes chapters which develop mathematical concepts according to difficulty. Each chapter has many games and activities which are to be taught and then set up on a free choice station basis. The book also includes a table on use according to grade level, an excellent guide for facilitating planning and a picture/description glossary of the necessary materials.

Materials are varied, colourful and durable although some items may require lamination. The Center for Inovation in Education Inc. (19225 Vineyard Lane, Saratoga, CA 95070) will provide these materials for a reasonable cost. There is quite a saving compared to catalogue ordering which is the main method of ordering for teachers in rural schools. Other necessary materials are easy to collect and are mostly household items.

The purpose of Mathematics Their Way is to provide an atmosphere where children can develop an understanding of mathematical concepts. Baratta-Lorton stresses materials and activities because real materials "...can be manipulated to illustrate the concept concretely, and can be experienced visually by the child."[2] In fact, a child proceeding in a Mathematics Their Way program would have the opportunity to explore the visual, tactile and oral methods of communicating a particular concept before attaching symbols to it.

The Lessons:

The lessons are constructed according to the needs of the three grade levels: Kindergarten, Grade One and Grade Two, and with the assistance of the 'grade level scale' and the 'guide to facilitate classroom planning' in the Mathematics Their Way resource book.

Attention is spent on providing both lesson time and reinforcement time (through station activities) for all grade levels.

These grade levels fluctuate according to individual needs. In other words, children who do not master a concept may remain at a certain level longer. Thus, the need for careful record keeping on the part of the teacher.

Although I have labelled the Groups "K", "One" and "Two" to minimize wordiness in the lessons, it may be necessary to assign children by name to group work or station work where several children are not working with their grade classmates. To avoid confusion, I keep a set of small charts, for who goes to which station, with detachable papers. Using such a method allows that grade level need never be mentioned. Therefore, bright or slow children can work comfortably at their own level without the stigma of direct labelling.

The first and last weeks of the lessons are set aside for setting up routines and stations, the calendar board, testing (using the Key Math Diagnostic Arithmetic Test) and seasonally related activities. During the last week I also introduced several pencil and paper tasks for the grade one's and two's. My interest was to see how they would cope with such tasks.

OUTLINE

Sixteen Week Program: Week 1 (Sept.) and Week 16 (Dec) used to set up, pretest, and post-test.

September	October	November	December
Kindergarten:	Kindergarten:	Kindergarten:	Kindergarten:
1. Free exploration (Ch.1) -weeks 2,3 and 4.	1. Free exploration (Ch.1)-weeks 5 and 6. 2. Pattern One:(Ch.2) -weeks 7,8 and 9.	1.Pattern One:(Ch2) week 10. 2.Sorting and Classifying:(Ch.3) -weeks 11,12 and 13.	1.Sorting and Classifying: (Ch.3) -week 14. 2.Comparing:(CH5) -week 15.
Grade One:	Grade One:	Grade One:	Grade One:
1. Free exploration (Ch.1) -weeks 2,3 and 4.	1.Pattern one:(Ch.2) - weeks 5,6 and 7. 2. Sorting and Classifying:(Ch.3) -weeks 8 and 9.	1. Sorting and Classifying:(Ch.3) -week 10. 2. Comparing:(Ch.5) -weeks 11 and 12. 3.Number:(Ch. 7,8,9) -week 13	1.Number:(Ch.7,8 and 9) -weeks 14 and 15
Grade Two:	Grade Two:	Grade Two:	Grade Two:
1. Free Exploration (Ch.1) -weeks 2,3 and 4.	1. Pattern One:(Ch.2) -weeks 5,6 and 7. 2.Sorting and Classifying:(Ch.3) -weeks 8 and 9.	1.Comparing:(Ch.5) -weeks 10 and 11. 2.Number:(Ch.7,8,9) -weeks 12 and 13.	1.Place Value (Ch. 11) -weeks 14 and15.

Week: Two: (III) (*Kindergarten present)

Monday: 1. Introduce Rhythmic clapping to the entire group. (Objective: to reproduce and describe rhythm patterns.) (See Guide p.21)

2. Introduce Unifix cubes--and free explore these (Objective: to become familiar with material and to follow new procedure.) (See Guide p.2-9)

3. Set up two stations: A. unifix cubes b. placticine numbers-mold these into correct shapes.

Tuesday: 1. Introduce and do a birthday graph. (See Guide p. 156) (Objective: to organize information to discover patterns)

2. Introduce eight junk boxes--and free explore these. (See Guide p.2-9)

3. Set up three stations: a. unifix cubes b. junk boxes c. placticine numbers.

Wednesday: 1. Reintroduce ghythmic clapping to the entire group. (See Guide p.21)

2. Introduce Pattern blocks--and free explore these (See Guide p.2-9)

3. Set up four stations: a. unifix cubes b. junk boxes c. placticine numbers d. pattern blocks.

4. Introduce unifix cubes and junk boxes to Kindergarten--and free explore.

Thursday: 1. Do rhythmic clapping patterns (See Guide p. 21)

2. Introduce and do water evaporation experiment. This will be done each morning following. (See Guide p. 157) (Objective: to make a comparison)

3. Introduce eight more junk boxes--free explore these. (See Guide p.2-9)

4. Set up same four stations as yesterday only use all of the junk boxes.

Friday: 1. Take pictures of all of the children--have these developed and xeroxed to be used during several activities. (Objective: to give the children a method of self identification which personalizes project work for them.)

2. Rhythmic clapping pattern (See Guide p.21)

3. Do four stations: a. ½ the junk boxes b. ½ the junk boxes c. blocks d. cubes

Week three: (ALL)

Monday: 1. Introduce and do the dot chart. (See Guide p. 23) (Objective: to reproduce, extend and describe patterns.)

2. Set up five stations: A. unifix cubes b. blocks c. placticine d. ½ junk boxes e. ½ junk boxes.

Tuesday: 1. Do the dot chart (see Guide p. 23)

2. Do rhythmic clapping (see Guide p. 21)

3. Introduce geoboards and free explore (See Guide p. 2-9)

4. Set up five stations: a. ½ junk boxes b. ½ junk boxes c. unifix cubes d. pattern blocks e. geoboards.

Wednesday: 1. Do count 1-3-1 (See Guide p. 108) (Do 1-10-1 for Grade Ones and twos) (Objective: to count backwards, to develop rhythm and 1 to 1 correspondance.)

2. Introduce tiles--free explore (Guide p. 2-9)--and then do six stations: a. ½ junk b. ½ junk c. blocks d. cubes e. geoboards f. tiles.

3. While others are at stations--introduce dot chart and geoboards--and free explore. (Kindergarten).

Thursday: 1. Do count 1-10-1 (See Guide p. 108)

2. Introduce and do Stand up - Sit down (See Guide p. 109) (Objective: to count backwards, develop co-ordination and 1 to 1 correspondance.)

3. Set up and do six stations: a. ½ junk b. ½ junk c. blocks d. cubes e. geoboards f. tiles.

4. For those who wish: can begin cutting out and collecting pattern block shapes on construction paper. (See Guide p. 387) These will be used later.

Friday: 1. Do count 1-3-1 (p. 108) and Stand up -Sit down (p. 109) and clapping (p. 21)

2. Show how to reproduce designs (See Guide p. 12) (Objective: to develop a sense of matching and comparing and to increase eye-hand co-ordination.)

3. Set up six stations: a. ½ junk b. ½ junk c. blocks d. tiles e. geoboards f. cubes (For station f.--do reproducing designs with a partner.)

Week Four: (All)

Monday: 1. Do count 1-10-1 (p.108) and rhythmic clapping (p.21)

2. Set up and do six stations: a. ½junk b. ½junk c. cubes d. geoboards e. tiles f. blocks (Do reproducing designs (p.12) with unifix cubes and blocks.)

3. For those who wish: continue cutting out pattern block shapes to be used later. (p.397)

Tuesday: 1. Count 1-15-1 (p.108) and rhythmic clapping (p.21)

2. Introduce Unifix Patterns (See Guide p.26) to each grade level seperately. Use more complex patterns for mature students. Alternate this with the six stations: a. ½junk b. ½junk c. blocks d. cubes e. geoboards f. tiles. (Use junk boxes to do reproducing designs, p.12.)

Wednesday: 1. Count 1-4-1 and 1-15-1 (p.108) and rhythmic clapping (p.21)

2. Do people row patterns (See Guide p.29) (Objective: to reproduce and extend patterns.)

3. Stations: a. ½junk b. ½junk c. cubes d. blocks e. geoboards f. tiles (Do reproducing designs at all stations.)

4. Introduce and explore Unifix Patterns with Kindergarten (See Guide p.26)

Thursday: 1. Do count 1-20-1 (p.108) and people row patterns (p.29) and dot patterns (p.35). (Objective: to reproduce and extend patterns.)

2. Stations: a. ½junk b. ½junk c. blocks d. cubes e. geoboards f. tiles (Do reproducing designs at all stations.)

Friday: 1. Do count 1-4-1 and 1-20-1 (p.108), People row patterns (p.29) and clapping (p.21).

2. Reintroduce and do dot patterns (p.35)

3. Introduce and do unifix snap and clap patterns (p.33). (Objective: to translate and analyze patterns.)

4. Introduce and do an Estimation. (Keep small). (See Guide p.308) (Objective: to connect an abstract idea to the real world, to make and check predictions and to solve a problem.)

Week Five:

Monday: 1. Do count 1-20-1 (p.109) and People Row patterns (p.29) and Stand-up-Sit down (p.105)

2. Grade one: Do six stations: ½junk, ½junk, blocks, cubes, tiles and geoboards. (Do reproducing designs or free exploration.)

3. Grade two: Introduce and do geoboard-unifix patterns (p.36) and geoboard sequences (p.37). (Objective: To reproduce, extend and analyze patterns and to practice deductive reasoning.

Tuesday: 1. Do count 1-20-1 (p.109) and rhythmic clapping (p.21) and Stand up-Sit down (p.105)

2. Grade two: Do six stations: ½junk, ½junk, blocks, cubes, tiles and geoboards.

3. Grade one: Introduce and do geoboard-unifix patterns (p.36) and geoboard sequences (p.37).

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* Wednesday: 1. Introduce and practice Takeover (p.110) (Objective: to practise counting backwards, body co-ordination and one to one correspondence.)

2. Kindergarten: Do 4 stations: free explore a. junk b. cubes c. blocks d. tiles

3. Grade one and two alternate at 3 stations and small lesson: Do 3 stations: a. geoboard sequences (p.37) b. geoboard-unifix patterns (p.36) and c. unifix snap and clap patterns (p.33)

Small lesson: Call 3 to 5 students to an area to make pattern block walls (p.39) (Objective: to create original patterns and to strengthen left to right progession.) Also show dot patterns (p.35) to be added to stations. Objective: to match and to observe similarities and differences.)

Thursday: 1. Do count 1-20-1 (p.109) and Stand-up Sit Down (p.105)

2. Grade one and two do stations: A. Geoboard sequences (p.37) b. geoboard-unifix patterns (p.36) c. unifix snap and clap patterns (p.33) d. dot patterns (p.35) and e. pattern block walls (p.39)

3. Call small groups: introduce and practice junk pattern cards (p.40) (Objective: to compare, relate and analyze patterns.

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* Friday: 1. Do the dot chart (p.23) and teach Inside-Outside (p.111) (Objective: counting backwards and one to one correspondence.)

2, Kindergarten: Stations: A. junk b. blocks c. tiles (free exploration)

3. Grade one and two: Stations: a. geoboard sequences (p.37) b. geoboard-unifix patterns (p.36) c. unifix snap and clap patterns (p.33) d. dot patterns (p.35) e. pattern block walls (p.39) and f. junk pattern cards (p.40).

Week Six:

Monday: 1. Do count 1-20-1 (p.108) and Inside-Outside (p.111)
Grade one and two: review rules of doing an estimation and do one.(p.308)

Tuesday: 1.Introduce and practice large numeral cards (p.44)(Objective:to learn sequencing and to observe the form of each numeral). These can be practised on the blackboard or on drawing paper using coloured crayons.
2.Grade one and two: Do stations:a)geoboard sequences(p.37)b.geoboard-unifix patterns(p.36) c.unifix snap and clap patterns(p.33)d.dot patterns (p.35)and e.pattern block walls(p.38) f.junk pattern cards(p.40)

Wednesday:1.Do count 1-5-1 and 1-20-1 (p.108)and stand up - sit down (p.105)
2.Grade one and two do six stations from yesterday. (Week 6-Tuesday)
3.Kindergarten:Introduce and practise a.geoboard sequences (p.37) b.geoboard-unifix patterns(p.36) and c.pattern block walls (p.38).

Thursday: 1.Do the dot chart (p.23) and Large numeral cards (p.44)
2.Grade one and two do six stations from Week 6 - Tuesday.

Friday:1.Do count 1-5-1 and 1-20-1 (p.108) and Large numeral cards (p.44)
2.Grade one and two do worksheets 8-11 (p.388) on numerals and then do six stations from Week 6 - Tuesday.
3.Kindergarten:Introduce and practice dot patterns (p.35)and junk pattern cards (p.40) (Kindergarten students may now go to all six Pattern One stations.)

Week Seven:

Tuesday: 1. Do count 1-20-1 (p.108) and do Take Over (p.110) and do rhythmic clapping (p.21)
2. Grade one and two: go to six stations listed on Week 6 -Tuesday. (Pattern One)

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Wednesday: 1. Do count 1-5-1 and 1-20-1 (p.108) and rhythmic clapping (p.21) and stand up-sit down (p.109)
2. Kindergarten: Grade one and two: all go to six Pattern One stations listed on Week 6 - Tuesday.

Thursday: 1. Count 1-20-1 (p.108) and Takeover (p.110)
2. Grade one and two: Do the Large number templates (p.50) (Objective: to practice copying numerals and to develop hand-eye co-ordination.
3. Grade one and two: all go to six Pattern One stations listed on week 6 - Tuesday.

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Friday: 1. All do unifix patterns (p.26) and do People row patterns (p.29)
2. All do a short estimation--children should now explain procedure and follow through (p.308).
3. Kindergarten, Grade one and two: All go to six Pattern One stations listed on week 6 - Tuesday.

** As this was the week I had to attend a conference I did not introduce many new activities. However, games and activities from Chapter Four, Counting, could be introduced at this time.

Week Eight:

Monday: 1.Count 1-20-1 (p.108) and Stand up-Sit down (p.109)
2.Grade one and two: All go to six Pattern One stations listed on Week 6-Tuesday.
3.Call small groups to an area to learn Sorting on the Overhead (p.59) (Objective: to observe, describe and make predictions about objects.)

Tuesday: 1.Do count 1-20-1 (p.108) and Takeover(p.110) and Sorting on the overhead (p.59)
2.Grade One and Two:introduce and practise Geoboard paths (p.81) and people sorting (p.61) and macaroni necklaces (p.42) (Objectives: to observe and describe different properties, to compare objects and to find different solutions to a problem.)

Wednesday: 1.Do count 1-5-1 and 1-20-1 (p.108) and Sorting on the overhead (p.59)
2.Kindergarten: Do six Pattern One stations listed on Week 6 - Tuesday.
3.Grade one and two:Introduce and practice mirrors(p.10) and food colouring(p.83) (Objectives:to discover properties, to note similarities and differences and to sort objects by their properties.)

Thursday: 1.Do count 1-20-1 (108) and Stand up-Sit down (p.109)
2.Grade one and two: Do three sorting and Classifying stations: A.mirrors(p.10) b. food colouring(p.83) and c. macaroni (p.42).
3.Call small groups to an area to learn The jars (p.8) and Border patterns (p.41) (Objectives:to create, measure and compare patterns or objects.)

Friday: 1.Do count 1-6-1 and 1-20-1 (p.108) and the dot chart(p.23) and large numeral cards(p.44).
2.Kindergarten:All go to four Pattern One stations:a.geoboard-unifix patterns (p.36)b.unifix snap and clap patterns (p.33) c.pattern block walls (p.38) and d.junk pattern cards (p.40).
3.Grade one and two: Do five sorting and classifying stations: a.mirrors(p.10) b.food colouring (p 83) c.macaroni (p.42) d. the jars (p.8) and e.border patterns (p.41).
4.Call small groups of grade one and two to an area to learn weighing common objects (p.9) (Objective:to measure and compare objects.)

Week Nine:

Monday: 1. Do count 1-20-1 (p.108) and Sorting on the Overhead (p.59)

2. Grade one and two: Do four sorting and classifying stations: a. food colouring (p.93) b. the jars (p.8) c. border patters (p.41) and d. weighing common objects (p.9)

3. Grade two: Called to an area to learn junk box sorting (p.64) (Objective: to sort objects by properties, to note similarities and differences and to apply an abstract idea to the real world.)

Tuesday: 1. Do count 1-20-1 (p.108) and people row patterns (p.29)

2. Grade one and two: all do four sorting stations listed on Week 9 - Monday.

3. Grade one: do junk box sorting (p.64) (while grade two is at stations.)

Wednesday: 1. Do count 1-7-1 and 1-20-1 (p.108) and stand up-sit down (p.109)

2. Kindergarten: Do four Pattern One stations as listed on Week 8 - Friday.

3. Grade one and two: do four sorting and classifying stations listed on Week 9 - Monday.

4. Call small groups of grade one and two to an area to learn Geoboard Arrow Game (p.92) (Objective: to follow directions, to compare and to find different solutions to a problem.)

Thursday: 1. Do count 1-20-1 (p.108) and People row patterns (p.29)

2. Grade one and two: do a real graph (two line) on soles of shoes. (p.146) (Objectives: to compare, count, add, subtract and organize data to discover patterns.)

3. Grade one and two: do four sorting and classifying stations listed on week 9 - Monday.

Friday: 1. Do count 1-7-1 and 1-20-1 (p.108) and Takeover (p.110)

2. All do a real graph (two line) on selecting a cube from two colours. (p.146)

3. All do an estimation on a Hallowe'en object. (p.308).

Week Ten:

Monday: 1. Do the dot chart (p.73) and People sorting (p.71)

2. Grade one: All go to four sorting and classifying stations as listed on Week Nine - Monday.

3. Grade two: Introduce and practice comparing with more, less or same cards. Do worksheet 24 (p.390) using unifix cubes, water, junk and weights. (p.116) (Objective: to measure, match, compare and draw conclusions.)

Tuesday: 1. Do count 1-25-1 (p.102) and Begin taking a height record to be checked once a month.

2. Grade one: All go to four sorting and classifying stations as listed on Week Nine - Monday.

3. Grade two: Introduce and do a short sorting walk (p.72) (Objective: to select objects with a particular property, to compare and to make judgements.)

Wednesday: 1. Introduce and practice Geoboard sorting game (p.80). (Objective: to note similarities and differences and describe properties used to sort objects.)

2. Kindergarten: All go to three Pattern One stations: A. unifix snap and clap patterns (p.33) b. pattern block walls (p.38) c. junk pattern cards (p.40)

3. Grade one: All go to three sorting stations: A. the jars (p.9) b. border patterns (p.41) and c. weighing common objects (p.9)

4. Grade two: Introduce and do Handfuls game (p.125) (Objective: to predict, compare and see relationships.)

Thursday: 1. All do a sorting walk (p.72)

2. Grade one: All go to three sorting stations listed on Week 10 - Wednesday.

3. Grade two: Teach and play Stack, tell, spin and win game (p.126) (Objective: to compare, to match and to see relationships.)

Friday: 1. All do a real graph (two line) on penny shaking heads or tails. (p.146)

2. Kindergarten: All go to three Pattern One stations listed on Week 10-Wednesday.

3. Grade one: All go to three sorting stations listed on Week 10 - Wednesday.

4. Grade two: Introduce and practice Measuring String (p.135) and the Water Timer (p.123) (Objectives: to measure, compare and predict relationships.)

Week Eleven:

Monday: 1. All do Intervals of Time (p.133) (Objective: to compare and to draw conclusions.)
2. All do Descriptions (p.74) (Objective: to observe, describe, compare and solve.)
3. Grade two: All go to four Comparing stations: a. Handfuls (p.125) b. Stack, tell, spin and win (p.126) c. Measuring string (p.135) and d. Water timer (p.123)
4. Grade one: Do People sorting (p.61) and practice making comparisons with more, less and same cards using cubes, water, junk and weights (p.116) and worksheet 24 (p.390)

Tuesday: 1. Do intervals of Time (p.133) and Descriptions (p.74)
2. Grade two: all go to four Comparing stations listed on Week 11 - Monday.
3. Grade one: Introduce and do a Sorting Walk (p.72) then go to three Sorting and Classifying stations listed on Week Ten-Wednesday.
4. Grade two: (When Grade one is at sorting stations) -Introduce and practice Mark the Scoops (p.136) (Objective: to compare, see relationships and conclude.)

Wednesday: 1. Re-introduce and do Intervals of time (p.133) and Descriptions (p.74)
2. Grade two go to five Comparing Stations: a. Handfuls (p.125) b. Stack, tell, spin and win (p.126) c. Measuring string (p.135) d. Water timer (p.123) and e. Mark the Scoops (p.136)
3. Grade one: All go to three Sorting stations as listed on Week Ten -Wednesday.
4. Kindergarten: Introduce and practice mirrors (p.10), food colouring (p.83) and the jars (p.8)

Thursday: 1. All practice counting different ways (ex. 2's and 5's), People Sorting (p.61)
2. Grade two: All go to five Comparing Stations listed on Week Eleven -Wednesday.
3. Grade one: Introduce and practice Stack, Tell, Spin and Win (p.126) and Measuring string (p.135) and Water timer (p.123).

Friday: 1. Do intervals of time (p.133) and rhythmic clapping (p.21)
2. All do a real graph (two line) on boys and girls (p.146)
3. Grade two: All go to five Comparing stations listed on Week eleven - Wednesday.
4. Grade one: All go to four Comparing stations listed on Week Eleven -Monday.
5. Kindergarten: Introduce and practice Boarder patterns (p.41).

Week Twelve:

Monday: 1. All do a Name Hop (use Grade one names) (p.78) (Objective: to note similarities and differences, to compare and to solve problems.)

2. Grade one: All do four Comparing stations listed on Week Eleven -Monday.

3. Grade two: Introduce and practice the Three Games (p.180) (Use 6-12 objects in each.) (Objective: to practice adding, subtracting and commutativity.)

Tuesday: 1. All do a Name Hop (use Grade two names) (p.78)

2. Grade two: All go to three Number stations: A. The HandGame (p.180) b. Lift the bowl (p.181) and c. Peek through the Wall (p.183)

3. Grade one: Introduce and practice Mark the Scoops (p.136)

Wednesday: 1. Do count 1-8-1 and 1-25-1 (p.100) and People sorting (p.61)

2. Grade two: all go to three Number stations listed on Week Twelve -Tuesday.

3. Grade one: All go to five comparing stations listed on Week Eleven -Wednesday.

4. Kindergarten: Introduce and practice Weighing common objects (p.9) and Macaroni (p.42)

Thursday: 1. All do name hops (p.78)

2. Grade one: All do five Comparing stations listed on Week Eleven -Wednesday.

3. Grade two: Introduce and do Exploring Toothpick Designs, do connecting level sentences. (p.169) (Objective: to count, to see relationships and to learn invariance of number.) (Recording: p.177)--Objective: to add and subtract.)

Friday 1. All do body measurements (p.120) (Objective: to measure, compare and see relationships.)

2. Grade One: All do three Comparing stations: a. Handfuls (p.125) b. Stack, tell, spin and win (p.126) c. Measuring string (p.135)

3. Grade two: All do three Number stations: a. Lift the Bowl (p.181) and The Hand Game (p.180) b. Toothpicks (p.169) c. Pattern Blocks (p.170)

4. Kindergarten: All do three Sorting stations: a. weighing common objects (p.9) b. the jars (p.8) c. border patterns (p.43).

5. Grade two: When others are at stations call to an area and show how to record number stations using colouring sheets and pasting designs. Teacher may print on connecting level statements. (p.177).

Week Thirteen:

Monday: 1.Introduce and all do Read My Mind (p.70) (Objective: to analyze and describe a collection by grouping it by a property of objects.)
2.Grade two: Do exploring, patterning and connecting statements for four Number stations: a.The Hand Game (p.180) and Lift the Bowl (p.181) b. Peek through the Wall (p.183) c.Pattern Blocks (p.170) and Cubes (p.173) d.Tiles (p.169).
3.Grade One: Introduce and practice The Three Games - (p.180)

Tuesday: 1.Do count 1-25-1 (p.109) and Descriptions (p.74)
2.Grade two. All do four Number stations listed on Week Thirteen - Monday. (Do recording at all number stations -- p.177)
3.Grade one: Introduce and practice number objects (use 4 or 5) with Toothpicks (p.169) pattern blocks (p.170) and cubes (p.173)

Wednesday: 1.Do count 1-9-1 and 1-25-1 (p.109) and Stand up-Sit down (p.105)
2.Grade two: All do four Number stations listed on Week Thirteen - Monday. (Do recordings --p.177 and put on connecting level statements.)
3.Grade one: All do four Number stations listed on Week Thirteen - Monday. (do recordings --p.177 and have teacher put on connecting level statements.)
4.Kindergarten: All do three sorting stations listed on Week Twelve -Friday. (*To assign a particular child to a range of numbers a card on a string can be used listing the numbers the child may choose from. This can hang around the child's neck.)

Thursday: 1.Do count 1-25-1 (p.109) and Read My Mind (p.70)
2.Grade one and two: Introduce and practice Beads (p.174) (Objective: to count, to explore arrangements of objects and to make and check predictions.)
3.Grade one and two: all now do five Number stations: a.The Hand Game (p.180) and Lift the Bowl (p.181) b.Peek through the Wall (p.183) c.Pattern blocks (p.170) and Cubes (p.173) d.Beans (p.174)
(Grade Two: Explore, record (p.177) and print connecting statements.
(Grade One: explore, record (p.177) and teacher prints connecting statements.)

Friday: 1.All do a real graph (two line) using different kinds of nuts. (p.146)
2.Kindergarten do three Sorting stations listed on Week Twelve - Friday.
3.Grade one and two: Introduce, explore and record unifix cubes (p.172 and 177).

Week Fourteen:

Monday: 1.All do a Word problem (p.204) using different numbers, (p.206).
2.To do one:All do six Number stations: a. The Hand game(p.170) and Lift the Bowl(p.171) b.Peek Through the Wall (p.172) c.Pattern Blocks(p.170) and Cubes(p.173) d. Beans(p.174) e.Unifix cubes (p.178):Recording(p.177)
3.Grade two:Introduce and practice The Cave Game (p.192) and Subtraction cards (p.193) (Objectives:to add, to subtract and to follow directions.)

Tuesday:1. Do count 1-30-1 (p.198) and People Sorting (p.61)
2.Grade Two:All do six Number stations listed on Week Fourteen - Monday.
3.Grade one:All practice The Cave Game (p.192) and Subtraction Cards (p.193).

Wednesday: 1.All do Word Problems (p.204) (Objectives:to count, add, subtract and multiply.)
2.Kindergarten:All go to three Sorting stations listed on Week Twelve - Friday
3.Grade one:All go to three Number stations:a.The Cave Game (p.192) b.Subtraction Cards (p.193) and c.Beans (p.174)
4.Grade two: Introduce and practice Base Ten Unifix Patterns (p.314)
(Objective:to pattern, to add, to multiply and to write mathematical symbols.)

Thursday:1.Do count 1-30-1 (p.198)
2.Grade one:All go to three Number stations listed on Week Fourteen -Wednesday
3.Grade two:Introduce and practice Measuring.(p.307)(Objective:to measure, compare and problem solve.)Then, do two Place Value stations; a.Measuring (p.307) and b.Base Ten Unifix Patterns (p.314)
4.Grade one: (when Grade two is at stations)--Introduce and practice Say it Fast (p.196) and Listen and Count (p.190). (Objectives:to count, to add and to recognize a quantity without counting.)

Friday: 1.All do Word Problems (p.204)
2.All--Introduce and practice The Whale Game (p.198) (Objective:to count, to add, to subtract and to discover relationships among different quantities.)
(*NB. I call it The Donut Game and use 'Cheerios').Grade two can write connecting level statements.
3.All do an estimation on a Christmas object (p.308)

Monday: 1.Do count 1-30-1 (p.198) and Word Problems (p.204).

2.Grade one:all go to three stations (Monday)listed on Week Fourteen-Wednesday.

3. Grade two:Introduce and practice Counting Jars (p.210) (Objective: to count, to make and check predictions and to solve problems.) Then,do three Place Value stations: a.Measuring(p.207) b.Base Ten Unifix Patterns (p.214) and c. Counting Jars (p.210)

4.Grade one: (When Grade two is at stations) Introduce and practice the symbolic level of the Three Games (p.237). (Objective: to add, to subtract and to use symbols to record events.)

Tuesday:1.All play Read My Mind (p.70)

2.Grade one: Do three Number stations (symbolic): a.Peek through the Window(p.193) b.The Cave Game (p.192) and c. Lift the Bowl (p.191) (*Use symbolic level worksheets (p.393-394)

3.Grade two:All go to three Place Value stations listed on Week Fifteen-Monday.

4.Small groups of Grade ones:called to an area to practice The Magic Box (p.248) (Objective: to order and to sort.)

Wednesday:1.All play The Donut Game (The Whale Game -- p.188).

2.Grade one: All go to three Number stations listed on Week Fifteen - Tuesday.

3.Grade two: All go to three Place Value stations listed on Week Fifteen -Monday.

4.Kindergarten:Introduce comparisons using more, less and same cards with cubes, water, junk and weights. (p.116)

Thursday:1.Do count 1-30-1 (p.198) and Word Problems (p.204).

2.Grade two:All go to three Place Value stations listed on Week Fifteen-Monday.

3.Grade one: Introduce and do Number book (p.219) using pattern blocks and pattern block cut-outs.(Objectives:to pattern, to add and to label concepts.)

Friday: 1.All play the Donut Game (The Whale Game -- p.188)

2.All do a real graph (three lines) using a seasonal idea. (ex. Christmas candy)

3.All do an estimation using a seasonal idea.(p.208).

Resources:

There are many lesson aids, games and materials available for teaching primary mathematics in the District Resource Centre of my school District (#59). There are several sets of activity cards for teaching reinforcement games. There are also sets of job cards and drill cards emphasizing addition and subtraction facts. There are sets of cassettes and filmstrips to introduce new concepts and sets of masters on counting and basic facts. The District also supplies either Investigating School Mathematics workbooks or Heath workbooks if requested. There are also extra copies of Project Math available.

In the School, the district has provided sets of blocks, abacuses, shapes kits, and some store purchased math games.

All of the materials mentioned are useful and can be integrated into a multigrade program. Using an adaptation of Mathematics Their Way, however, sets up a sequential program involving activities which are devised for children-pages 5-8. The students have the advantage of working with many types of materials, both bought and made, before sitting down to tasks such as drill cards and fact worksheets. Later, these will be useful additions to the program and will act as reinforcers. The materials already in the school will become part of the Mathematics Their Way program. Thus, the adapted series of lessons pulls together district aids, school materials and some new materials purchased specifically to initiate this program.

RESULTS

I conducted the lessons, as described, with few modifications from September to December 1979.

All students upon initial testing showed average to bright scores on the Key Math Diagnostic test except one grade two and three kindergarteners who were working slightly below grade level. At the end of the fifteen week period these kindergarten students have shown acquisition of several basic mathematics principles and are working at assigned tasks during lesson and stations times. The other students all show mastery of the concepts covered either at or above their grade level.

One of the most rewarding results is the obvious interest the students have in exploring the creative and intricate patterns of mathematics. When questioned informally, 65% of the students chose mathematics as their favorite subject. During free periods or between lessons, Math Their Way games are chosen more often than any other classroom game or activity.

In general, all the students have a positive and interested attitude towards mathematics lessons in this multigrade rural classroom.

Implementation:

Although I found the lessons easy to follow, occassionally I had some difficulty. The most trying problem occured when a school day was cancelled or a special activity was scheduled and mathematics was deleted.. When this happened, I found it easiest to extend the math period the next few days to teach lessons or introduce stations, rather than fall behind in the outlined schedule.

Another recomendation is to gradually introduce kindergarten to working with the class as a whole. Initially, many of the kindergarteners had difficulty listening,, following directions and attending to tasks. Their habits improved when their stations were moved away from the large group. In this group's case, a kindergarten aid circulated amongst them giving directions and support when difficulties occured. (Perhaps, a parent volunteer could act as a similar resource.) The kindergarteners were soon ready to rejoin the large group.

Finally, in the case of grade two's who show an early apptitude with the lessons and activities, several options are available. Because of the open-endedness of the program bright students are encouraged to extend patterns to depict complex equations. I also had one girl give mini lessons at stations for slower students who were having difficulties remembering procedures. As well, an occassional pencil and paper task reassures you and the student that he or she can cope with a more traditional classroom format.

Using a materials-oriented primary mathematics program based on the book MATHEMATICS THEIR WAY (by Mary Baratta-Lorton) has been both successful and fun. I have found the time necessary to collect materials, set up stations and record data (Baratta-Lorton includes several easy to follow forms) far less than the time I used to spend marking workbooks, running off worksheets and formulating tests.

I will continue to adapt MATHEMATICS THEIR WAY to my multigrade classroom and I seriously urge others in a similar position to try this alternate mathematics program.

Although, city resources and a one-grade level classroom would be ideal for MATHEMATICS THEIR WAY, with a little adaptation and planning it has proven to be both rewarding personally and successful academically in this rural multigrade - primary setting.

The following set of lessons covers fourteen weeks. Each game or activity is followed by the corresponding page number in Mathematics Their Way. Each activity in the book lists: skills, materials and activity. The assumption being that the Resource Book is an necessary part of the adaptation of the program. Each week's set of lessons is set up on one page and divided to easily be cut apart and made into reference cards.

(* The Resource Book, Mathematics Their Way, can be purchased from:

Addison-Wesley Canada Ltd.
P.O. Box 580
36 Prince Andrew Place
Don Mills, 403, Ontario)

POOR

QUALITY

ORIGINAL